CENTRAL INTELLIGENCE AGENCY

INFORMATION REPORT

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SUBJECT	Isotope Separation at the Hertz Institute	**DATE DISTR.**	3 February 1955
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THE SOURCE EVALUATIONS IN THIS REPORT ARE DEFINITIVE. THE APPRAISAL OF CONTENT IS TENTATIVE. (FOR KEY SEE REVERSE)

[redacted]

1. The institute of Professor Gustav Hertz located near Sukhumi (see sketches on page 5 and 7) was subordinate to the Ninth Directorate and later to the First Directorate of the MVD in Moscow. The two directorates probably merged. Physics Professor Novikov was the chief scientist of the First Directorate. A Georgian metallurgist, General Kochlavashvili, was in charge of the institutes of Hertz and Manfred von Ardenne as deputy to Zavenyagin (fnu), who had replaced General Zverev (fnu) as chief of the Ninth Directorate.[1] Professor Hertz' group was composed of 120 German PWs and 25 to 30 German experts. The remaining personnel were either German PWs, who were skilled workers and laboratory assistants, or Soviet students, most of whom were Georgians, who prepared their doctor's theses with German assistance. In 1948 the Germans were replaced by Soviets and transferred to quarantine camps for two or three years before being released.

2. The development activities which began in 1945 and were scheduled for completion by 1950 continued until about 1951 or 1952. Von Ardenne, chief of the institute at Sinop, stated that, after completion of the projects, one or both of the institutes would become quarantine camps. Von Ardenne believed that most experts would be released in 1955. Tbilisi State University was greatly interested in the equipment of Hertz' institute and source believed that the institute or equipment might be turned over to the university. Aside from the equipment procured in Germany, necessary equipment was constructed at the institute. Such equipment included a mass spectrograph, Geiger counters, and a vacuum soldering set.

3. Generally, the German experts believed that the Soviets were primarily interested in acquiring their knowledge. The Soviets wanted to learn whether the system for isotope separation developed by Hertz could be adapted for use by large plants. Soviet research activities in this field were conducted independently. Hertz had to write a monthly report on the progress of his work. The activities of the institute were hampered by the rivalry between the Academy of Sciences and the MVD. No details of the rivalry were available.

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STATE	X	ARMY	X	NAVY	X	AIR	X	FBI		AEC	X			OSI EV X

(NOTE: Washington distribution indicated by "X"; Field distribution by "#".)

4. In 1945, Zavenyagin ordered uranium-235 isotope separation by the method developed by Hertz. The Soviets requested that glass instruments be replaced by metal instruments and ordered that existing diaphragms (barriers) be enlarged. Source was not sure which type of isotope separation was involved. When asked whether gaseous diffusion or thermodiffusion was used, he stated that it probably had been thermodiffusion. He repeatedly maintained that only uranium isotopes were separated, and when uranium hexafluoride
25X1 (UF_6) was mentioned [redacted] he stated that that was the agent charged to the diffusion box.

5. The scientific personnel at the institute included:

Hertz, in charge of the entire project.

Dr. Justus Muhlenpfordt, who made calculations for the "pumps". Stating that Hertz had done the same, source used the term "pump" when referring to the box in which the diffusion took place.

Dr. Werner Schuetze, who designed the mass spectograph which was built by Engineer Hottmann (fnu).

Dr. Karl Zuehlke, who made corrosion tests with nickel, copper, iron, and pure aluminum. He found that aluminum of an undetermined degree of purity proved to be the most resistant material.

Dr. Boris Ikert of the chemical laboratory, who rechecked Zuehlke's results.

Dr. Werner Hartmann, who constructed counting tubes (Zaehlrohre). He later made the analyses which had been done in Moscow before the counting tubes were completed.

Kvartskhava (fnu), a Soviet supervisor who had his own laboratory for private research.

Dr. Reinhold Reichmann, who designed and constructed tube diaphragms which were delivered to Moscow.

Yermin (fnu), a Soviet who continued this work after Reichmann's death.

Dr. Heinz Barwich, calculating expert for Hertz.

Dr. Helmut Bumm, who made physical analyses of the metals received at the institute. As he was the soldering expert of the institute, he constructed the vacuum soldering furnace.

Engineer Mauler (fnu), who undertook metallurgical analyses and galvanic experiments, and who prepared the production of tube diaphragms designed by Reichmann.

Professor Korshavin (fnu), a Soviet with a pro-German attitude who did private work in the field of color photography.

Dr. Boris Ikert, who tested the corrosion properties of metals.

Graduate engineer Schimohr (fnu), who apparently worked in the field of fluorocompounds. (For a table of organization and further list of personnel, see pages 8 to 10.)

6. Fellow workers stated that work at the institute began in 1945/1946. Hertz and his laboratory assistants assembled and put into operation the original diffusion apparatus with 20 glass cascades developed by Hertz. Any analysis necessary was done in Moscow. As soon as useful results were obtained, the first stage of the research project was started. In order to increase experience in the field of metals, glass instruments were replaced by metal equipment, e.g., nickel-plated copper pumps were used instead of glass pumps. The dimensions and the testing pressure of 10^{-7} Torr remained unchanged.[2] No other details were available.

7. The second work stage was started in winter 1947/1948. [redacted] project to enlarge the pumps to an external diameter of 100 mm and a height of 400 mm. Two of these pumps were series-connected in cascades. All further experiments were conducted with twin-step cascades. Metal cloth, 8 by 12 cm, was used as diaphragms. No further details were available. The equipment used effected an enrichment by 1.5 to four percent; the maximum value of four percent was rarely obtained. Analyses were made with the counting tube designed by Hartmann. The mass spectrograph designed by Schuetze was not ready for operation before late 1948 or early 1949. [redacted] the enrichment process involved the lighter isotope.

8. The third stage started in late 1948 with the construction of two pumps, each with a diaphragm area of 15 by 80 cm. In spring 1949, this equipment was put into operation and experiments with various types of diaphragms were made. The box in which the diffusion took place, referred to as "pump" by Hertz, was 100 to 120 cm long, 80 to 90 cm high, and 30 to 40 cm wide; it was made of nickel-plated iron parts which were vacuum-soldered, using soldering material with various melting points, such as copper, silver, and gold. The interior parts of the box were made of nickel-plated copper.[3] [redacted] The entire set, including the pumping unit, covered an area of about five by five meters. At first the diaphragms had 10,000 to 20,000 meshes per square cm or were even finer; Hertz had brought them from Germany in 1945. After 1948, Soviet tissues made of thick, uneven wire were used which were not as smooth or as regular as the woven German diaphragms. Attempts were made to eliminate these faults by rolling the material, by applying nickel, etc. Source believed that these tissues were made of nickel wire. No shipments of materials from East Germany were observed.

9. The final concentration obtained in two such boxes was not more than 1.5 to 1.8 percent, presumably as a result of the irregular arrangement of the meshes. Sheet-metal reflectors for the production of a laminar flow were not required. For a process lasting several weeks, the unit had to be charged only once.

10. Simultaneously with the third work stage, the design and construction of a four-stage pump was initiated as the fourth development stage. This unit had two four-stage pumps connected in cascades. Each chamber was six or seven cm by 15 cm and was 60 cm high. The diaphragm area was about 60 by 6 by 15 cm. Source stated that UF_6 vapor heated to a temperature of 150° C was pumped through four tubes attached to the long side of the box into four chambers and there against a diaphragm, extended at a right angle to the gas flow, where separation was effected by suction. The vapor was cooled down to 15° C. The UF_6 was heated by coils in the M-shaped tubes and cooled by water. The enrichment thus obtained was four percent. The unit was charged once with about 240 cu cm of UF_6 for a process lasting about 12 hours.

11. Serious difficulties were encountered in the manufacture of the boxes, especially because of the many edges. Since no leak detector was available, precise material analyses and faultless soldering were necessary. As a result of these difficulties, the Soviets ordered the designing of a round box with an external diameter of about 60 cm and a height of 100 to 120 cm. The diaphragm was planned to be fitted on the external wall of the unit. Plans were being made for the construction of the unit by a special factory in Moscow [redacted]

12. The ministry[1] in Moscow requested the production of tube diaphragms, about 80 cm long, evenly permeable over the entire length. Various attempts failed until a sintered diaphragm produced by Dr. Reinhold Reichmann's method finally met the requirements. Nickel oxide was pressed through a plodder and dropped into an acetone bath. The tubes, 80 cm long, 16 to 18 mm in diameter, and two to ten mm thick, were pushed onto ceramic tubes and sintered. To eliminate the wear of the plodder, a hardening process with chromium hydrogen was applied. The production, which had started in 1949, reached a weekly output of 100 to 150 units by late 1950.

13. Muhlenpfordt was ordered by the Soviets to design the equipment for a large-scale separation of isotopes by the system in use at the institute. [redacted] 250 cascades, some as large as a room, were projected. The entire installation was to be made of metal and was to guarantee a density of about 10^{-7} Torr. The unit was to have interchangeable parts. The diffusion process from charging until the first tapping was to last nine months. A vacuum soldering apparatus constructed at the institute had the shape of a hemispherical bell, 1.20 to 1.30 meters in diameter, and had an operating pressure of 10^{-4} Torr.

14. In 1949 or 1950, Hertz, Barwich, Schuetze, and Muhlenpfordt were flown from Moscow on a secret mission to some town in Siberia. It was rumored that they went to "Kefir town", in an area which had many of the latest atomic installations. Source believed, therefore, that the activities of the Hertz institute could not be of great importance to the Soviets. The name "Kefir town" indicated that this town was in an area where large amounts of kefir (sour milk) were consumed.[4]

15. Von Ardenne's institute, which was similar to that of Hertz, was located in the Sinop Sanatorium near the Kelasuri railroad station. The activities of this institute included von Ardenne's work on a cyclotron, foil diaphragm work by Professor Thiessen (a rival of Dr. Reichmann), and Dr. Max Steenbeck's work on the ultracentrifuge.

16. Before he died in early 1947, Professor Heylandt worked in PW Camp [redacted] in Krasnogorsk on a 10,000 cubic meter set for the production of liquid air which was allegedly to be built in Magnitogrosk. The mobile American unit for liquid hydrogen was replaced by a stationary installation in a single-story building. The hydrogen was put in Dior-type bottles or in steel bottles, and the amount not used for the sintering furnace was sold.

[redacted] Comments:

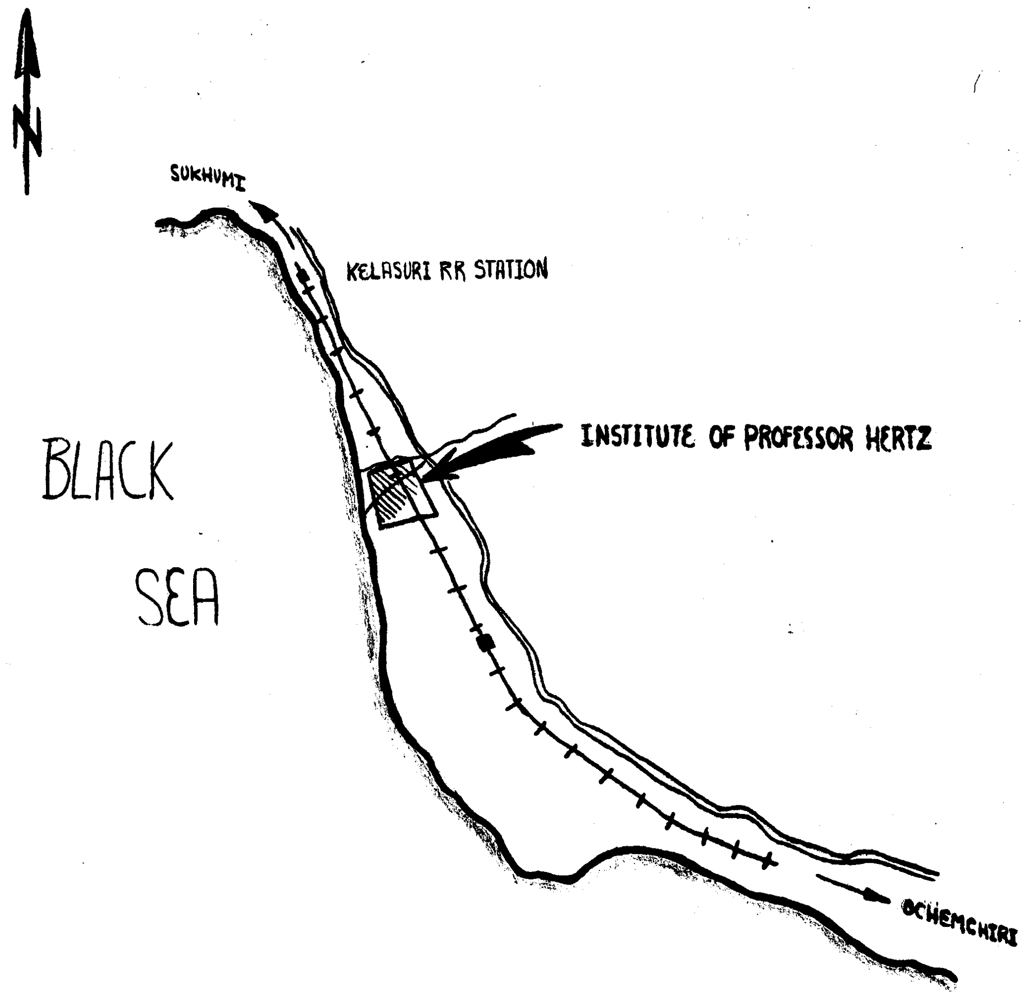
1. According to available information, the Ninth Directorate of the NKVD (later MVD) was established during World War II and took over the functions of the Special Technical Bureau, which was concerned with technical questions, and probably included all laboratories of the NKVD. After the establishment of the First Chief Directorate, subordinate to the Council of Ministers, all those laboratories and functions concerned with atomic energy were transferred to this directorate from the Ninth Directorate. Lt. Gen. A.P. Zavenyagin was appointed chief of the Ninth Directorate when it was established, in addition to his position as Deputy People's Commissar of Internal Affairs. Maj. Gen. Kravchenko was appointed Deputy Chief of the Ninth Directorate. Source's reference to Zverev may have been to A.G. Zverev, who was Minister of Finance. Gen. Kochlavashvili has previously been reported as chief of the Hertz and Von Ardenne institutes and was probably subordinate to Zavenyagin, although not actually his deputy.

2. Torr is a unit of measurement indicating one mm of mercury per sq cm of surface.

3. For a schematic representation of the diffusion process, see page 11. For first sketch of source's impressions of the diffusion box, see page 13. For a corrected sketch of source's impressions, see page 15. Source was not clear about the structure of the unit.

4. Kefir was not located.

LOCATION OF HERTZ INSTITUTE



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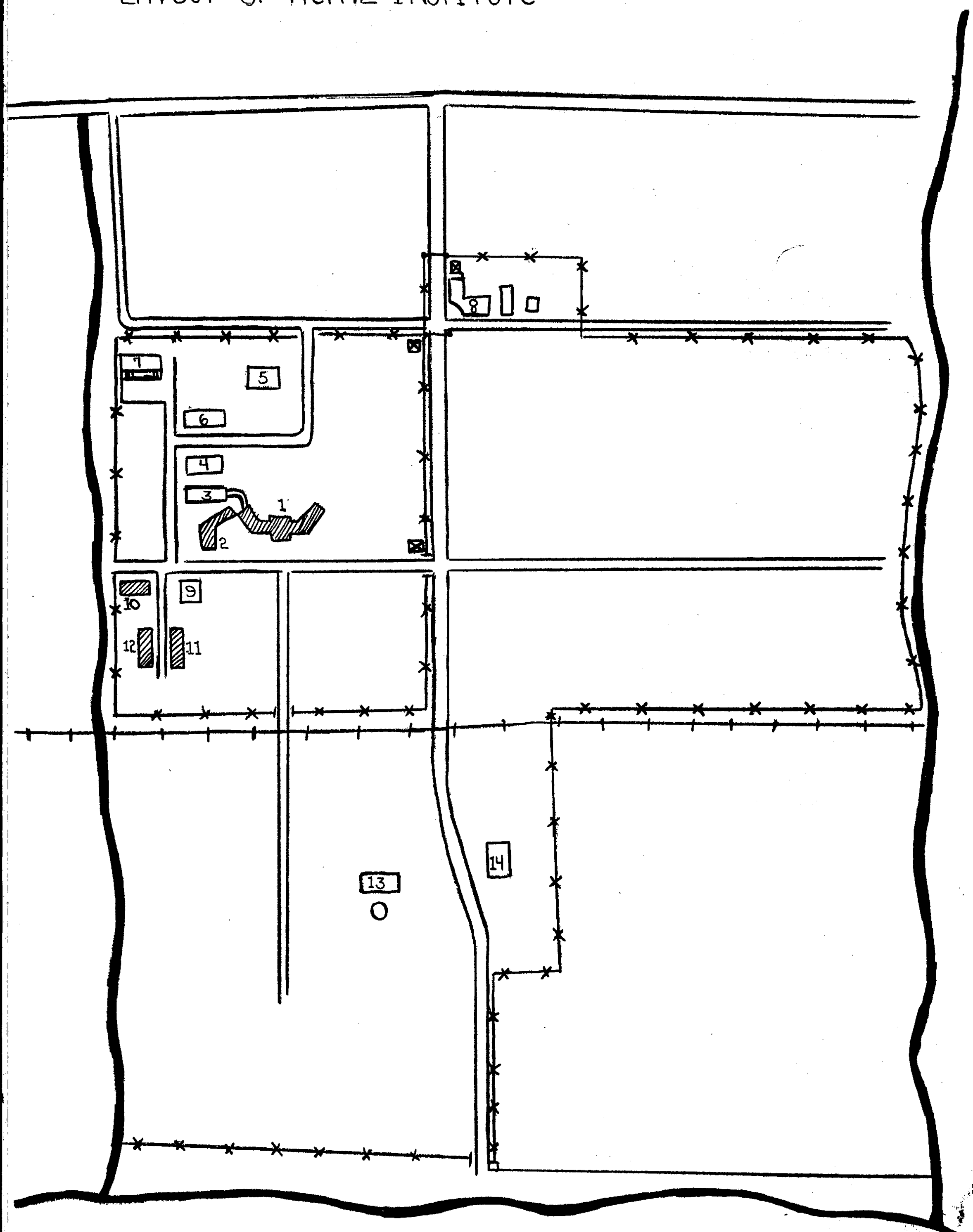
Legend to Layout of Hertz Institute

Shaded buildings were old; others were constructed after 1946.

1. Three-story institute building, about 80 by 100 meters.
2. Large experimental laboratory.
3. Workshop.
4. Workshop.
5. Power station with four diesel generators. The cable from Sukhumi, which had been laid in 1948 or 1949, was seldom used.
6. Chemical laboratory.
7. Store with loading ramp for light metals and materials.
8. Komendatura.
9. Hydrogen storage area.
10. Shop with metal saws.
11. Main depot and administration area.
12. Storage of sheet metal, tubes, and scrap.
13. Soviet guest house.
14. Villa of Professor Hertz.

Houses of the German personnel were located between the Hertz villa and the komendatura.

LAYOUT OF HERTZ INSTITUTE



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[redacted]

Table of Organization and Personnel of Hertz Institute

Ministry of Internal Affairs (MVD)

Department 1 [1]

Chief: Zavenyagin (fnu)
Scientific chief: Professor Novikov (fnu)
Assistant: Professor Kalashnikov (fnu). The scientific chief and assistant visited the institute four times a year.

Institute of Professor Hertz

Zavenyagin's deputy in charge: General Kochlavashvili (fnu).[1]
Chief: Prof. Dr. Gustav Hertz
Assistant directors: Dr. Werner Schuetze and Kvartskhava (fnu), a Soviet. Soviet management.

One independent office at the institute was directly subordinated to the MVD. The assistant directors were in charge of the physics laboratories, chemistry laboratories, workshops, and designing offices.

Physics Laboratories:

Laboratory under Hertz: [redacted] Georgian physicist, Gverdtsiteli (fnu); four Georgians [redacted] and Margarete Raedel, a German laboratory assistant.

Laboratory under Muhlenpfordt: a Georgian; laboratory inspector Walter Knable, who was still in Ilinskaya quarantine camp by late 1953; Engineer Gerd Mueller; and others.

Laboratory under Schuetze: Mrs. Ordzhonikidze (fnu), laboratory assistant Chernov (fnu), four Soviet laboratory assistants, Gerhard Saegel, a precision mechanic, and other Germans.

Laboratory under Zuehlke: no information available.

Laboratory under Hartmann: a Soviet woman, Engineer Leo Senzky, and several other Germans.

Laboratory under Kvartskhava: three Soviets.

Laboratory under Reichmann: a Soviet woman, two Soviet men, and three or four German handicraft workers. After Reichmann's death, Yermin took over.

Barwich's office: a Soviet doctorate candidate.

Laboratory under Bumm: laboratory assistant Hans Loehr.

Laboratory under Mauler: one assistant.

Chemistry Laboratories:

Laboratory under Korshavin: about 20 Soviet men and women. German experts Ikert and Schimohr depended on Korshavin's personnel, even though they had their own laboratories.

Workshops:

Mechanical workshop under Kurochkin (fnu), a Soviet, with 50 to 60 German PWs, including: Gerhardt Hoenow, who worked for Hertz; chief mechanic Bruno Striepling; precision mechanics Herbert Martschinske, Guenther Janosch, Felix Per, Helmut Oehlschlagel, and Saegel (fnu); welder Rudi Milbradt; lathe-operator Rudolf Pophal; fitter Karl-Heinz Weber; and Helmut Bart, Kurt Juerges, and Jungclaussen (fnu), a nephew of Hertz who might have worked at other shops as well. These PWs were gradually replaced by Soviets.

Electric workshop under Engineer Alfons Staudenmaier with German PWs, including electromechanics Erwin Walz, Friedrich Weck, Hermann Will, and Hausch (fnu).

Glass blowing plant under foreman Max Saegel, with four or five PWs, among them Rudolf Riess, who was arrested.

Department for liquid air and liquid oxygen under Esche (fnu).

Department for liquid hydrogen, with a Soviet woman engineer.

Designing Offices:

General designing office under Engineer Ernst Hottman, with two technical draftsmen.

Designing office [redacted] with one draftsman working for Hertz.

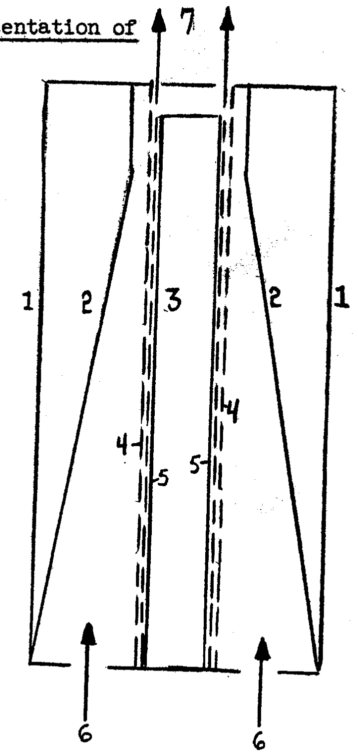
Personnel of Von Ardenne's Institute
and Other Institutes [redacted]

** Friedrich Bair, a mechanic
Dr. Hans Bartel
Dr. Viktor Bayerl, probably stationed in the Moscow area
** Erwin Becker
Alexander Bergengruen, unskilled laborer
Dr. Karl Bernhard
Dr. Ludwig Bewilogua, who worked with Professor Vollmer in Moscow
Dr. Ernst Busse
* Dr. Delvendahl (fnu)
Harry Dittwald, expert for photographic plates
Margarete Doevrient, a goldsmith
Herbert Doss
Gustav Fliegner
Herman Florek, son-in-law of Professor Thiessen
Erich Franke
Heinz Franke
Gaedicke (fnu), chief mechanic
Ursula Giering
Alexander Goldback
** Hermann Hage
* Dr. Med. Harren (fnu)
* Henschel (fnu)
Karl Hensinger
Helmut Hepp, chemist
Willi Hoefs and his son Hansi
Gerhard Jaeger, chief engineer
Mrs. Felicitas Jahn
* Frank Joachim, assistant master at a secondary school who worked with Dr. Pose in the Moscow area
Ferdinand Kafka
Siegfried Klein, a precision mechanic
Margot Koerber
* Kretzig (fnu)
Professor Paul Kronenburg, who was in Osiauri, Georgian SSR, in 1949
Dr. Hans Krueger, who was transferred from Hertz to Dr. Pose
Gerda Langsdorf, librarian
Dr. Hans Lehmann, who was transferred from von Ardenne in 1950
Emil Lorenz, glass blower
* Graduate Engineer Maydel
Kurt Meinhardt, allegedly Dr. Eng., was messenger
Dr. Wilhelm Menke, biologist, was first with von Ardenne and later in the Sverdlovsk area
Mrs. Ellen Mueller, von Ardenne's secretary

Graduate Engineer Horst Nowak, technical draftsman with Dr. Pose
Engineer Hans Juergen von Oertzen, with Dr. Pose
Dr. Johannes Pany, first with von Ardenne, later in Sverdlovsk area
Franz Heinrich Pottmeier, laboratory worker
Dr. Herbert Reibedanz, von Ardenne's best-qualified man
Dr. Gustav Richter, worked for Vollmer in Moscow area
Dr. Phil. Karl Riewe, worked for Dr. Pose, was later arrested
Dr. Med. Kurt Rintelen
Rudolf Schefel
Ingrid Schilling, Thiessen's secretary
Engineer Hans Schlesing
Clemens Schichting
Hermann Schmal
Horst Schroeder, laboratory worker
Walter Schroeder, who died
Franz Schrottke
Karl Schulz, barber
Engineer Karl Schumacher, welder
Max Siegling, glass blower
Engineer Karl Sille
Dr. Wolfgang Stocke
Miss Elsa Suchland, von Ardenne's secretary
Prof. Dr. Peter Thiessen
Dr. Robert Trattner
Gustav Treff
Gustav Uhlmann, worked with Dr. Pose in Moscow area
Maximillian Wied, store manager
Britta Wiedemann, librarian with Dr. Pose
Dr. Werner Wittstadt
Elfriede Zabel
Guenther Zawadill
Ludwig Ziehl
Dr. Zippe (fnu)

* Still in Ilinskaya quarantine camp by late 1953
** Repatriated

Schematic Representation of Diffusion Process



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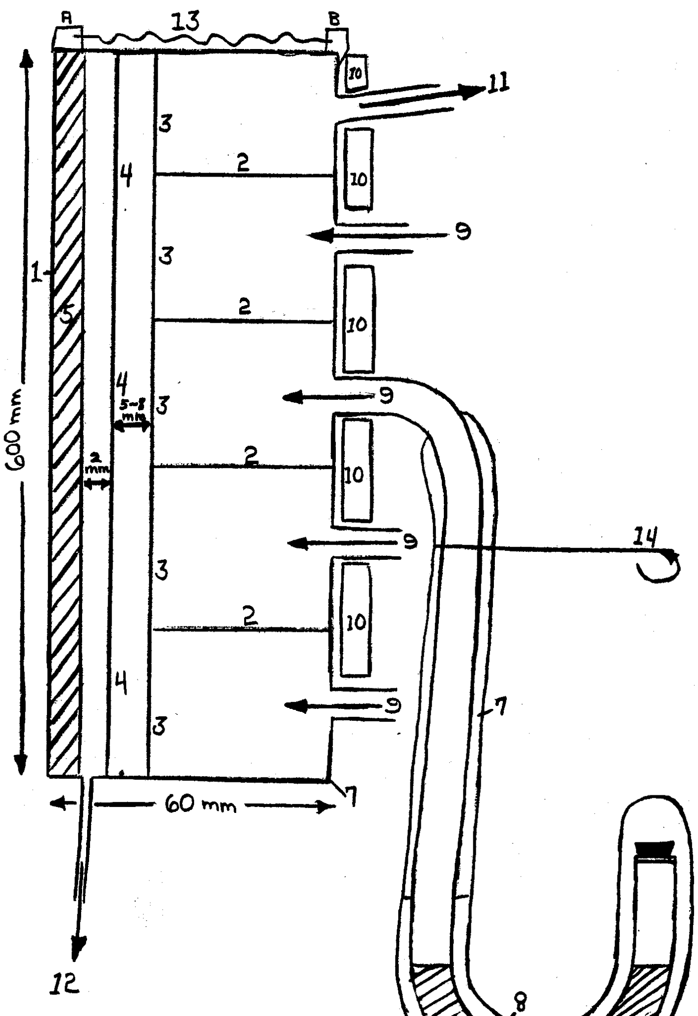
Legend

1. Nickel-plated iron wall of box
2. Reflector sheets of nickel-plated copper
3. Cooling area (wall)
4. Rectifier diaphragm
5. Diaphragm. The distance between No. 3 and No. 5 is two mm; the distance between No. 5 and No. 4 is five to eight mm.
6. Intake of UF_6 vapor
7. Suction aperture

Legend to First Sketch of Diffusion Box

1. Nickel-plated iron wall of diffusion box
2. Four nickel-plated copper partitions
3. Wire-cloth diaphragm, about 60 by 150 by 600 mm, so-called "rectifier"
4. Wire-cloth diaphragm, about 60 by 150 by 600 mm
5. Water-cooled wall, 15° C
6. UF_6 kept in tube sealed at one end. At line 14 on the sketch, the tube is turned about 90°. Gas entry temperature: 150° C
7. Heat-insulating coat
8. Coat with heating coils
9. Four gas-intake openings, each with tube as shown under No. 6
10. Heating agents
11. Suction of exhaust vapor
12. Suction of drops dropping down the cooling wall
13. Lid
    a. Soft-soldered part
    b. Hard-soldered part
14. See No. 6

FIRST SKETCH OF DIFFUSION BOX



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Legend to Corrected Version

The right side and the lid were the same as shown in previous sketch. This sketch shows different subdivisions of the rear wall and a different suction slot in the cooling wall.

1. Projecting part with notch

2. Suction of vapor

3. Suction of liquid

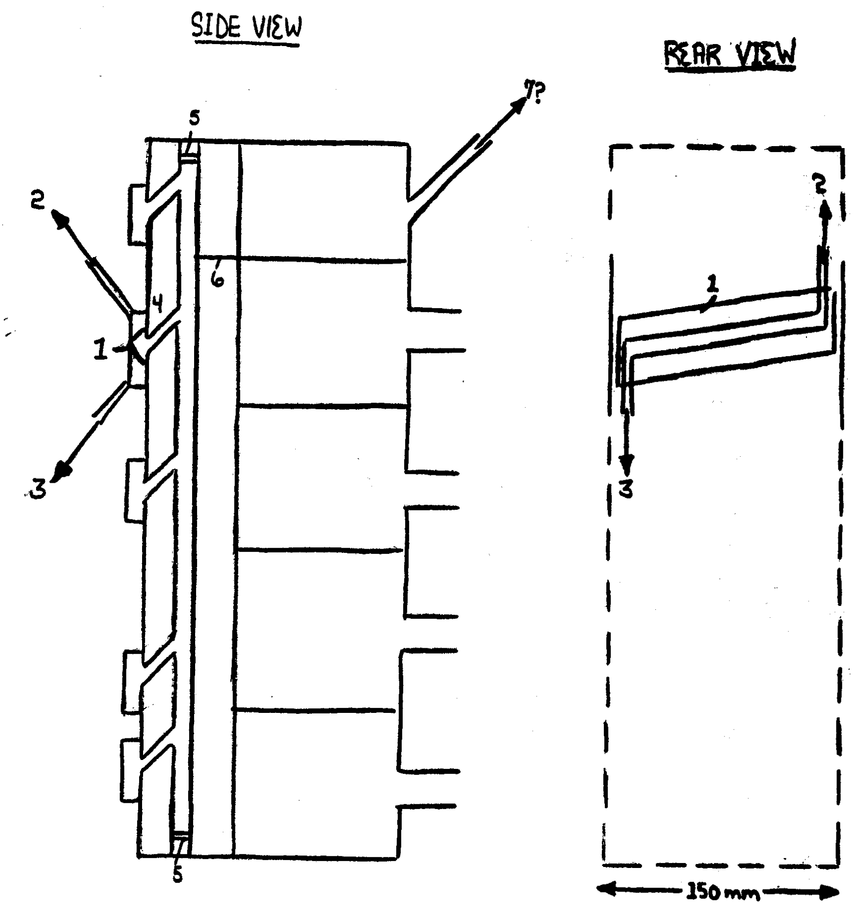
4. Channels in cooling walls

5. Seals

6. Partition wall elongated by the rectifier diaphragm (Gleichrichter Diaphragm) as far as the diaphragm

7. Possible suction aperture. Source was very unsure.

CORRECTED VERSION OF DIFFUSION BOX



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